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Procedia - Social and Behavioral Sciences 127 (2014) 73 – 77

Procedia
Social and Behavioral Sciences

PSIWORLD 2013

Bioethical education in teaching Biology

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Abstract

Bioethical education looks at the education of young people, high school and college students in teaching Biology so as they will be able to apply both ethical laws and biology laws in their subsequent scientific research and endeavours. Their day to day life is not to be overlooked either as the same laws will govern their interaction with other people and living creatures on Earth. Bioethical education is absolutely necessary especially in the final years of high school, in academic education in the profile of biology, encompassing heuristic strategies, interactive teaching methods and modern methods resorting to multi-media.

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Selection and peer-review under responsibility of Romanian Society of Applied Experimental Psychology.

Keywords: bioethical education; bioethics; biology; curriculum; teaching.

1. Introduction

Between June 26 and June 29, 2012, Erasmus Medical Center in Rotterdam hosted the 11th edition of the International Association of Bioethics: „Think ahead, Bioethics and the future, the future in bioethics”. At this conference addressed the key issues relevant to the future, including artificial biology, life-prolonging strategies, environmental problems, moral responsibility for future generations, future technologies in health, ethics and research in developing countries, food and ethics, public health. Looking to the future, of course we need to look back into the past, namely, what has been achieved in the field of bioethics, what has been learned in the past, the lessons we haven't learned. In search for the necessary lessons and what must currently be done in bioethics, we

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have bioethics future in sight. Education policy and practice contribute to bioethics and bioethical policy and practice materialized by education.

„Education stands as the subject matter of Pedagogy; the word comes from Latin, respectively, „educare-educare (educere)”, meaning to grow, to cultivate, to guide, to educate; „educatio”-growth, cultivation, guidance, education. It is the socio-human phenomenon which enables students to acquire theoretical and practical knowledge on the basis of what mankind has accumulated throughout the social and historical evolution, shaping the personality and professional skills of the young generation as useful social entities.”(Ciobanu, 2009)

The bioethical (Greek. bios = life, ethikos or ethos = character, ethical, moral) education is a component of moral (lat. mos, moris, moralis = manners, moral behavioural customs) education and also a cornerstone of it, has ethics as a fundament, which represents the science which studies moral laws. The bioethical education aims to educate young people so as to apply moral laws in close correlation with the laws of biology in scientific research and scientific advances in biology, medicine, agriculture, and also in everyday aspects of their social, professional and family life and life in general on Earth. The concept of bioethics was introduced by Van Rensselaer (1970), who considered it necessary to combine biological knowledge and knowledge about life with knowledge on the human, moral and ethical values. "Bioethics has emerged as a new discipline which unites biological knowledge with knowledge of human value systems. I chose bio - to represent biological knowledge, the science of living systems, I chose ethics - to represent human value systems." (Van Rensselaer, 2000). In the context of the new scientific discoveries, it is absolutely necessary, as a means of moral education, for the young people to become aware of the importance of bioethical education. Such an educational approach should lead to practical and theoretical scientific results and scientific phenomenon and, also, should result in understanding of their use in a responsible, ethical and moral way in human relationships with their peers, with other living creatures and nature.

2. Research objectives and procedures

The objectives of the present research concerns the identification of ways of bioethical education through the teaching of Biology in pre-academic and academic education, based on the peculiarities of age and the assertion of bioethical education by means of teaching biological sciences in the context of profound scientific metamorphosis domain. The research was conducted in the „I.L.Caragiale” National College of Bucharest, in the period 2008-2010, with teen classes of students and BIOTERRA University of Bucharest in 2012-2013, with students from two years of study. We used as research methods literature study, observing teaching, discussion, debates.

3. Bioethical education in the educational process, in teaching Biology-results and discussion

Through bioethical education, young people understand that throughout their lives they have to act responsibly towards science and humanity, regardless of their professional goals and career objectives in the future. Wherever they may live and work, they need to act in a bioethical sense without endangering creatures, nature or Terra.

Bioethical education is at the crossroads of some fundamental sciences, such as Education Sciences, Psychology, Biology (Greek bios=life; logos=science, speech), respectively, sciences that deal with the study of living creatures, Agronomy, Veterinary medicine and Human Medicine (Medical Sciences), see Fig. 1.

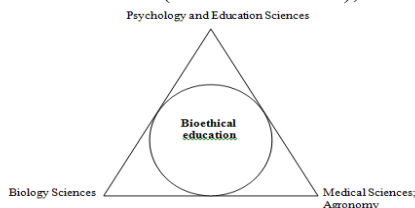


Fig. 1-The scheme of the fundamental science of bioethical education

Bioethical education raises issues relating to both age peculiarities and individual features of the youth. This type of education, as a component of moral education, can be briefly started in the family and is to be further nourished

in adolescence when not only the intellectual abilities, but also the national curriculum for high school level makes its achievement possible. This education continues in specialized universities in accordance with the academic curriculum and later on, at adult age, through continuous training and development, self-development and self-training, the curriculum (from Latin, curriculum = race, running) being „...the content of instructional-educational activities, but interrelated with educational objectives, teaching methods, embodiments of the activities and others.” (Jinga & Istrate, 1998).

Various biology-based subjects taught in high school, such as Biology or Health Education, which are part of the optional school curriculum within „The Health Education Programme 2005”, or several specialized academic courses, such as Genetics taught at the Faculty of Biology, contribute to the moral education of the youth by enlarging teaching upon bioethical issues. “Teaching is the teacher’s activity that mustn’t overlook, but on the contrary, requires becoming aware of them. It cannot be separated from the learning activity of the student, but must be modified in design and in our practice in the classroom. This should be the initiation, coordination, stimulation, support, checking students’ learning activities by the teacher.” (Ciobanu, 2008).

Examples of biology lessons where teaching contributions to bioethical education can be successfully incorporated include: “Scope and bioethical considerations in human genetics-genetic advice, prenatal diagnosis, in vitro fertilization, therapeutic cloning, and genic therapy” (grade 12), „Conception and contraception” (grade 11), “Sexually transmitted diseases” (grade 10), „Cloning” (grade 9) and others. Classes on „Health Education” can promote an effective bioethical education through lessons such as: “Identity and sexual orientation, STI/HIV/AIDS”, „In vitro fertilization”, „Legislation on sexuality. Pornography and prostitution”.

Bioethical education requires the use of deductive heuristic strategies, analogies, interactive methods in the teaching process. On the one hand, these methods will boost analytical thinking, analogic reasoning, synthetic and flexible approaches and, on the other hand, they will encourage personal responses, opinions backed by scientific arguments, scientific demonstrations and interactions in groups and teams. The atmosphere emerging in this teaching environment will be similar to that characteristic of scientists and decision-makers who can impact the humankind in a positive and non-intrusive manner. Therefore, the methods underlying these teaching strategies are diverse, ranging from traditional active methods (lectures with opponents, lecture-debate-discussion, Socratic dialogues) to modern methods (fishbowl, clustering, cooperation). For example, fishbowling is based on educational interaction as the students are divided into two groups (8 – 10) and will take turns getting involved in the discussion, being observed / not involved in discussion, acting as observers in order to come up with solutions to controversial issues and to develop good relationships in their group, to increase their observation skills and others. „Through its interventions, the teacher-moderator will try to bring new ideas, new viewpoints and arguments to the overall task completion” (Cerghit, 2006).

An example of lesson of bioethical education is „Types of asexual reproduction in living world” from the national biology curriculum, for the 10th grade. For accomplishing its objectives, „the students should be able to support their own ideas and conclusions, using correct terminology” and „the students should be able to argue their own conclusions based on fundamental biological concepts” (related to culture „in vitro”, cloning), apply a heuristic and interactive strategy based on fishbowl technique. Students, through group discussions, find solutions, decide on answers to following controversy problem-questions: „In the case of the vertebrate animal, are the copies of nucleus donor always genetically identical to the donor of the nucleus? Support your opinion with arguments!”, „Does animal cloning have more advantages and / or disadvantages? Support your opinion with arguments!”. The fishbowl technique is applied by going through all „the steps” in a programmed instruction sheet, where there are evaluation items, responses to self-evaluation and tasks to improve learning. It leads to bioethical education by emphasizing the importance of applying biological sciences, respectively, in this example, the cloning technique, in a responsible and ethical way, both to themselves and to life on Earth.

In Biology textbooks for the 11th grade, pursuing the national curriculum, the lesson „Conception and contraception” is increasingly necessary to methodically and efficiently address abortion (spontaneous or induced expulsion of a fetus before it is viable), which, at the current stage of development of obstetric-gynecological science, despite some realities in developing, promoting and implementing of contraception, still remains one of the main methods of family planning. Bioethical education can be applied by encouraging students’ use of brainstorming and synthetic methods, where each student group is stimulated to emit ideas about abortion without

assessing them in the first instance, and after issuing stage ideas, they bring the discussion to an end and evaluate, appreciate valid ideas, draw conclusions, while being closely monitored and helped by the teacher. The act in question is immoral homicide as the purpose is to destroy life, to kill a human being, who is totally devoid of defense or rights, without suffering any feelings of guilt. Knowledge and application of contraceptive methods and not practising abortion come in as highly recommendable.

Another example of a lesson of bioethical education in high school, namely in „Health Education”- an optional course in the biology curriculum for the 11th grade, is „In vitro fertilization”. This lesson is based on a heuristic strategy, mainly the discussion method. The dialogue with the young students, is based on the following questions that require thinking: „What is the status of the human embryo?”; „Is a period of human life, or a group of soulless cells?”; „When does a human being become a moral instance?”. The overwhelming majority students from „I.L.Caragiale” National College of Bucharest involved in research actively participated in discussions, showing epistemological interest and curiosity. In ancient oriental traditions human age is calculated from the moment of conception, while in western culture is considered that life starts from the moment of birth. For a long time, doctors acknowledged life as such only after the first movements of the fetus. Soul problem causes heated discussions in the religious dogmas. According to contemporary Christian theory, the soul is a divine gift, is assigned to the embryo even at conception. Paradoxically, while hundreds of women choose daily to abort, others go to all lengths (and sometimes unacceptable) to become pregnant. The fate of frozen embryos is in the midst of heated debate today. Most times they are abandoned by couples involved in artificial insemination. Thousands of embryos are stored today in Human Embryos Banks and specialists do not want to take responsibility for the decision on the fate of the „geno-fund reserve”. Moral problems arise from the possibilities available today which are being heard more and more strongly in the literature of the kind: long-term freezing can overturn the entire human reproductive behavior by changing the laws of heredity; embryo banks can offer grandmother's granddaughter an embryo or a daughter will be able to have her sister as her child.

When it comes to academic education, namely Microbiology teaching for the students of BIOTERRA University of Bucharest or interactive lectures on Microbiology, for example, which focus on microorganisms - may promote the bioethical education by tackling the artificial manipulation of genes found in microorganisms. Thus, microorganisms with a new genetic architecture can be created and they may feature peculiar infectious properties and unpredictable ecological effects. These artificially created microorganisms, such as viruses and bacteria which are not to be met in nature, can be used in the so-called genetic war, which might prove just as dangerous for the human being as the thermo-nuclear war. Students must be provided with the kind of theoretical and practical training which can be later turned into the ethical foundation of their career. They should become able to internalize the humanistic values of their future profession.

This, however, requires the formation of relevant attitudes to science and technology „... the antidote for errors or unwanted behavior, indiscriminate acceptance of all scientific applications, or the opposite, speculation may instill distrust and hostility to science ... Building such relevant attitudes to science and technology requires a finality of contemporary education.” (Văideanu, 1988). Relevant attitudes would mean „adequate and correct understanding of science (and technology), scientific knowledge assimilation, the premise of an open and receptive attitude.” (Păun, 1991).

Biology lessons with ecological content must tackle the worldwide ecological crisis, arising with industrialization and urbanization trends. Human beings do feature certain necrophilia tendencies, turning into undesirable entities who endanger the ecological balance on Terra. These lessons foster the accountability and raising awareness of students, the development of their environmental consciousness in correlation with bioethical education. Human arrogance and exploitation have been reported to have led to ecological catastrophes and by destroying nature, man destroys the very foundation of their own existence. Nature is not an object of exploitation by humans. Van Rensselaer Potter himself coined the term bioethics after becoming aware of the ecological crisis and after realizing that the natural order of the biosphere is subject to existence patterns in the world and the ways in which human beings relate to these.

The teaching means ought to include info-biology labs, electronic platforms or special software programs and multi-media labs for teachers and students where they can watch educational-scientific films on bioethical topics, such as biological war, in vitro fertilization, human cloning, HIV, medical, social and socio-professional behaviour towards HIV-positive persons, stem cell donors, egg and sperm donors, cell banks, human trafficking, sexual

exploitation of girls and women, sexual harassment, etc. In addition, demonstrative teaching materials can be brought in, like, scientific posters, genetics atlases, human anatomy atlases and others. In bioethics education, as to assessment and evaluation, most recommendable are alternative methods, such as project work, individual scientific research, scientific papers, portfolios, self-evaluation, student observation, and all other student-centred methods which will keep students motivated and involved to a larger and larger extent.

Man becomes moral issue when complying with applicable laws and morals both in everyday life and in scientific research biological, medical, agricultural, and business in all its scientific forays. This is the direction in which it is recommended bioethical education of young people as a means of moral education and also as a component of moral education. In my opinion, have no place discussions, contrary to some concepts (Țirdea & Gramma, 2005), about the phenomenon of death as the appropriate approach to bioethics and bioethical education, which by its very etymology of their, bios, Greek term, refers to life and not death. We do not educate meaning struck down of individuals to others survive.

4. Conclusions

Bioethical education lies at the heart of moral education and it is one of its basic components. It is obvious that moral laws should intertwine with biological, medical, agronomical laws and this is how bioethical education contributes to educating young people. They will be enabled to apply moral laws in their mundane and professional life and adopt a responsible conduct in their research work. Given the modern context of teaching biology disciplines, the methods, techniques and means should be carefully chosen so as to harmoniously combine traditional approaches with heuristic strategies and multi-media equipment in both undergraduate and further education. In consequence, they have been identified in research ways of bioethical education by teaching biological disciplines, in pre-academic and academic education and it contribute to promote bioethical education among students and young people by teaching life sciences, as a necessity of contemporary moral education, responsible for the future of humanity, the research objectives are fulfilled.

References

- Cerghit, I. (2006). *Teaching Methods*. Iași: Polirom Publishing House.
- Ciobanu, I., M. (2009). *Pedagogy Applied in Natural Sciences*. Bucharest: Corint and Akademos Art Publishing Houses.
- Ciobanu, M. (2008). *Teaching Biological Sciences*. Bucharest: Didactical and Pedagogical Publishing House.
- Jinga, I., & Istrate, E. (1998). *Manual of pedagogy*. Bucharest: ALL Educational SA.
- Păun, E. (1991). Benchmarks for current debate, relevant scientific education. *Pedagogy magazine*, 10, 11-21.
- Țirdea, N., T., & Gramma, C., R. (2005). Suffering, death and euthanasia through Bioethics. In Țirdea, N., T (Eds.), *Elements of bioethics* (pp.17-28). Kishinev: National Center for Bioethics.
- Van Rensselaer, P. (2000). Bioethics the Science of Survival. *Perspectives in Biology and Medicine*, 14: 1970, 120-153.
- Văideanu, G. (1988). *Education on the border between millennia*. Bucharest: Policy Publishing House.